Algebra III
Infinite Geometric Series
Sigma Notation

Name_____
Date_____
Period_____

Find the sum of each infinite geometric series, if it exists.

1. $a_1 = 6,\ r = \frac{11}{12}$

2. $9+6+4+\ldots$

3. $3-9+27-\ldots$

Find the common fraction equivalent for the following repeating decimals.

4. $0.\overline{9}$

5. $0.\overline{15}$

Find the first 3 terms for the series described below.

6. $S = 9,\ r = \frac{1}{3}$

7. $S = \frac{27}{4}, r = -\frac{1}{3}$

Use sigma notation to express each of the following.

8. $7+10+13+16+19$

9. $5+10+15+20+\ldots+50$

10. $2-6+18-54+162-486$

Find the sum of each series.

11. $\sum_{n=1}^{25} 2n$

12. $\sum_{k=1}^{6} (-2)^k$

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Find the sum of each infinite geometric series, if it exists.

1. $a_1 = 6,\ r = \frac{11}{12}$

$S_n = \frac{6}{1-\frac{11}{12}} = \frac{6}{\frac{1}{12}} = \frac{6}{1}\cdot\frac{12}{1} = 72$

2. $9+6+4+\ldots$

$S_n = \frac{9}{1-\frac{2}{3}} = \frac{9}{\frac{1}{3}} = 27$

3. $3-9+27-\ldots$

no sum
$r < -1$

Find the common fraction equivalent for the following repeating decimals.

4. $0.\overline{9}$ $\quad .9 + .09 + .009$

$S_n = \frac{.9}{1-.1} = \frac{.9}{.9} = 1$

5. $0.\overline{15}$ $\quad .15 + .0015 + .000015$

$S_n = \frac{.15}{1-.1} = \frac{.15}{.99} = \frac{15}{99} = \frac{5}{33}$

Find the first 3 terms for the series described below.

6. $S = 9,\ r = \frac{1}{3}$ $\quad S_n = \frac{a_1}{1-r}$

$9 = \frac{a_1}{1-\frac{1}{3}}$

$\frac{2}{3}\cdot 9 = a_1$

$a_1 = 6\ \ a_2 = 2\ \ a_3 = \frac{2}{3}$

7. $S = \frac{27}{4},\ r = -\frac{1}{3}$ $\quad \frac{27}{4} = \frac{a_1}{1+\frac{1}{3}}$

$\frac{4}{3}\cdot\frac{27}{4} = \frac{a_1}{\frac{4}{3}}$

$a_1 = 9\ \ a_2 = -3\ \ a_3 = 1$

Use sigma notation to express each of the following.

8. $7+10+13+16+19$

$a_n = 7 + (n-1)3$
$= 7 + 3n - 3$
$= 3n + 4$

$\sum_{n=1}^{5} 3n+4$

9. $5+10+15+20+\ldots+50$

$a_n = 5 + (n-1)5$ $\quad 50 = 5n$
$= 5 + 5n - 5$ $\quad 10 = n$
$= 5n$

$\sum_{n=1}^{10} 5n$

10. $2-6+18-54+162-486$

$a_n = 2(-3)^{n-1}$

$\sum_{n=1}^{6} 2(-3)^{n-1}$

Find the sum of each series.

11. $\sum_{n=1}^{25} 2n$

$S_{25} = \frac{(2+50)25}{2} = 650$

12. $\sum_{k=1}^{6} (-2)^k$ $\quad S_6 = \frac{-2(1-(-2)^6)}{1-(-2)}$

$\frac{-2(1-64)}{3} = \frac{-2(-63)}{3} = \frac{126}{3}$

$= 42$